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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KEVIN DURANT, DAVID MINTZ, and ROBERT OHLINE [1]

Appeal 2015-002158
Application 11/603,943
Technology Center 3700

Before ERIC B. GRIMES, ULRIKE W. JENKS, and
ROBERT A. POLLOCK, *Administrative Patent Judges*.

GRIMES, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method of determining the shape of a bendable instrument such as an endoscope, which have been rejected as obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

"Bendable instruments come in many forms such as catheters, colonoscopes, endoscopes and the like. Control elements are used to bend

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[1] Appellants identify the Real Party in Interest as Intuitive Surgical Operations, Inc. (Appeal Br. 2.)

the instruments into a desired shape or as part of steering or maneuvering the instrument as needed for a surgical or exploratory procedure." (Spec. ¶ 2.) "[K]nowing the shape of the instrument may provide useful information for maneuvering the instrument or to aid in the procedure." (*Id.*)

Claims 1, 2, 4–14, and 22–26 are on appeal. Claim 1 is illustrative and reads as follows:

> 1. A method of determining a shape of a bendable instrument, comprising:
>
> placing the instrument in a calibration position;
>
> tensioning first and second control elements of the instrument in the calibration position to remove slack from the first and second control elements without bending the instrument, whereby a calibration position of each of the first and second control elements is determined from the tensioning;
>
> moving the first control element a first amount from the calibration position of the first control element and moving the second control element a second amount from the calibration position of the second control element to bend the instrument;
>
> measuring the first and second amounts; and
>
> determining the shape of the instrument by using a modeled kinematic relationship that correlates a sum of the first and second amounts to the shape of the instrument.

DISCUSSION

The Examiner has rejected claims 1, 2, 4–11, and 22–26 under 35 U.S.C. § 103(a) as obvious based on Kawai[2] and Lia.[3] (Ans. 5.) The Examiner has rejected claims 12–14 under 35 U.S.C. § 103(a) as obvious

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[2] Kawai et al., US 2004/0138530 A1, published July 15, 2004.
[3] Lia et al., US 2005/0168571 A1, published Aug. 4, 2005.

based on Kawai, Lia, and Arai.[4] (Ans. 10.) The same issue is dispositive for both rejections.

The Examiner finds that Kawai discloses most of the limitations of claim 1, including "removing slack from one hauling wire without bending the instrument . . . and suggests that the same features would apply to other hauling wire." (*Id.* at 6.) The Examiner finds that "Lia evidences tensioning first and second control elements of the instrument in the calibration position to remove slack from the first and second control elements without bending the instrument." (*Id.*) The Examiner concludes that it would have been obvious "to incorporate a second control element for removal of slack as taught by Lia into the manipulatable endoscope taught by Kawai in order to remove unnecessary slack that slows down responsiveness of the endoscope to bending commands." (*Id.* at 6–7.)

We agree with the Examiner that the method of claim 1 would have been obvious based on Kawai and Lia. Kawai states that endoscopes are widely known that include a "traction member" such as a wire, driven by a motor to bend the distal tip of the endoscope. (Kawai ¶ 4.) Kawai states that a conventional endoscope includes, among other things, "a tension detecting unit that detects tension of the wire, and [a] slack control unit [that] controls the slack of the wire based on outputs of the tension detecting unit," as well as units that detect the amount and direction of the wire's displacement. (*Id.* ¶ 6.)

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[4] Arai, JP 2000-300511 A, published Oct. 31, 2000.

Kawai discloses an apparatus that is "capable of controlling looseness at a neutral reference position even if the both hauling units become loose at the neutral reference position." (*Id.* ¶ 13.) Kawai states that a "hauling unit" is one that "hauls a subject to be operated and which bends or rotates the subject" — in other words, a wire. (*Id.* ¶ 14.)

Kawai's Figure 1 is reproduced, in part, below:

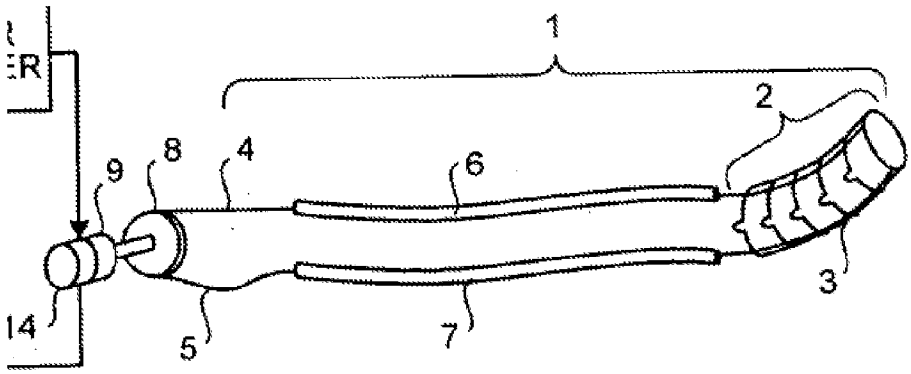

Figure 1 shows an embodiment of Kawai's motorized endoscope. (*Id.* ¶ 66.) The device includes "wires **4** and **5** for bending the distal bending section **2** vertically and laterally" and motor **9**. (*Id.* ¶ 68.) Kawai states that "if the motor **9** is driven to rotate the pulley **8**, the one wire **4** wound around the pulley **8** is pulled, and the other wire **5** is sent out. With this, the distal bending section **2** is bent upward." (*Id.* ¶ 69.)

Kawai states that "if the wires **4** and **5** extend with time, both the wires **4** and **5** become loose in some cases in an initial state (neutral reference position) in which the distal bending section **2** is not bent in the vertical direction." (*Id.* ¶ 73.) In that case, "even if attempt is made to bend the distal bending section **2** in any of upper and lower directions, the distal bending section **2** is not bent until the motor **9** is rotated to a position where the slack of the wire in that direction is resolved." (*Id.*)

Kawai discloses a correction table having values for a control signal Rmot to be sent to motor **9** based on the relationship of the bend angle (position) R, of distal bending section **2**, with a lower limit value R1 and an upper limit value R2. (*Id.* ¶¶ 74–75.) Kawai states that

> the correction table **12** outputs a control signal Rmot in which a variation amount thereof with respect to the target value R becomes greater in the target value R including the neutral reference position where both the wires **4** and **5** become loose than a range other than the range of the target value R, and the correction table **12** swiftly rotates the motor **9** and swiftly resolves the slack of the wires.

(*Id.* ¶ 76.)

Kawai discloses that its device can also include sensors that detect the amount of movement of each of the hauling wires and output wire position signals to a wire position detector. (*Id.* ¶ 130.) The wire position detector then determines the position of the tip of the distal bending section based on the two wire position signals. (*Id.*)

Thus, Kawai discloses placing an endoscope in an initial state ("neutral reference position"), or calibration position, then removing slack in the control elements (wires) by sending a control signal to the motor that controls movement of the wires, based on a value that depends on the bend angle of the tip of the endoscope. Kawai also discloses that the position of the tip of the endoscope (i.e., the shape of the device) can be determined, after the wires are later moved, by measuring the amount of movement of the wires and determining the position of the endoscope's tip based on the wire position signals.

Similar to Kawai, Lia discloses improving the operation of a remote viewing device such as an endoscope by "removing at least a portion of

slack from at least one control cable attached to a servo motor." (Lia ¶ 6.) The method "comprises fixing the servo motor where the specified tension is encountered and determining a first servo control signal value corresponding to no angular deflection in a viewing head." (*Id.*)

Lia discloses that the "zero-point settings for the servo motors **34** corresponding [to] no deflection in the viewing head **22** are determined . . . by rotating the servo motors **34** until each of the pair of the control cables **108** is equally taunt [sic, taut]." (*Id.* ¶ 39.) "As part of determining the zero-point setting, the servo motors **34** are rotated until their rotation in either direction requires the same increase in torque. This corresponds to the viewing head **22** being undeflected." (*Id.*) "The new zero-point servo control signal values are then stored . . . in memory **46**." (*Id.*)

Thus, Lia discloses tensioning two control elements (cables) of a bendable instrument to remove slack from both elements, without bending the instrument (i.e., the viewing head of the instrument is undeflected) and storing the zero-point settings, which indicate the position of the control elements in the instrument's undeflected condition. We agree with the Examiner that the cited references would have made obvious the device of appealed claim 1.

Both Kawai and Lia disclose removing slack from two elements that control bending of an endoscope. Kawai discloses doing so in a "neutral reference position" and later determining the position of the tip of the endoscope, after the wires are moved, based on movement of the wires. These disclosures are evidence that Kawai's neutral reference position refers to a position in which the endoscope is not bent. In addition, as the

Examiner has noted, Lia discloses "removing the initial slack until a slight increase in torque is detected (paragraph [0037–0038]). Furthermore, Lia evidences the 'zero point settings' that corresponds to the no deflection of the viewing head as in paragraph [0039]." (Ans. 17.) Thus, both references disclose removing slack from control elements with the device in an unbent position.

Appellants argue that the Examiner's interpretation of "calibration" (in the claim phrase "calibration position") is incorrect. (Appeal Br. 14–16.)

Regardless of what definition of "calibration" the Examiner cited, however, the claim itself makes clear that "calibration position" refers to a position in which the instrument is not bent, because it refers to "remov[ing] slack from the first and second control elements *without bending the instrument*, whereby a calibration position of each of the first and second control elements is determined." (Claim 1, emphasis added.) The Examiner correctly found that both Kawai and Lia disclose removing slack from the control elements of an endoscope without bending the instrument. *See* Ans. 6: "Kawai discloses removing slack from one hauling wire without bending the instrument. . . . Lia evidences tensioning first and second control elements of the instrument in the calibration position to remove slack . . . without bending the instrument." Thus, the Examiner has shown that the cited references disclose the claimed element.

Appellants also argue that "none of the paragraphs of Kawai cited by the Examiner, nor any other disclosure in Kawai, discloses slack removal without bending the instrument." (Appeal Br. 17.)

As discussed above, however, Kawai's disclosure of removing slack from the wires in a "neutral reference position," and then determining the position of the tip of the endoscope based on later movement of the wires, strongly suggests that Kawai's neutral reference position is one in which the endoscope is not bent. In any event, the rejection also relies on Lia, which expressly discloses determining zero-point settings for the motors that move its control elements, where the zero-point settings correspond to no deflection in the viewing head. Thus, when the teachings of the cited references are considered together, they would have made obvious the disputed limitation.

Appellants also argue "the Examiner has not clearly set forth the differences between the claims and Kawai and Lia." (Appeal Br. 21.)

We disagree. The Examiner found that Kawai discloses most of the limitations of claim 1 (Ans. 5–6) but "does not explicitly teach tensioning a second control element of the instrument in the calibration position to remove slack from the first and second control elements without bending the instrument." (*Id.* at 6.) The Examiner found that this limitation is disclosed by Lia. (*Id.*)

> [T]he PTO carries its procedural burden of establishing a prima facie case when its rejection satisfies 35 U.S.C. § 132, in "notify[ing] the applicant . . . [by] stating the reasons for [its] rejection, or objection or requirement, together with such information and references as may be useful in judging of the propriety of continuing the prosecution of [the] application."

In re Jung, 637 F.3d 1356, 1362 (Fed. Cir. 2011) (quoting 35 U.S.C. § 132, alterations by the *Jung* court). That burden has been met here. *See also id.* at 1363: "[A]ll that is required of the office to meet its prima facie burden of

production is to set forth the statutory basis of the rejection and the reference or references relied upon in a sufficiently articulate and informative manner as to meet the notice requirement of § 132."

Finally, with respect to claim 1, Appellants argue that a skilled artisan would have lacked motivation to modify Kawai to remove slack without bending the instrument because Kawai's calibration is based on calibrating an endoscope that is in a bent position. (Appeal Br. 23–24.) Similarly, Appellants argue that "one of ordinary skill in the art would not have had a reason to modify Kawai in view of Lia for the purpose asserted by the Examiner because Kawai already possesses this capability and teaches a different technique to compensate for slack." (*Id.* at 24.)

These arguments are unconvincing for the reasons already discussed. Specifically, Kawai teaches removing slack from an endoscope when it is in a "neutral reference position," which is reasonably interpreted to mean a position in which the endoscope is not bent, and Lia discloses determining zero-point settings that correspond to no deflection in an endoscope's viewing head. Thus, the cited references disclose the disputed limitation.

Appellants also argue that "[t]he Examiner asserted at pages 7 and 9 of the Office Action that Lia discloses the various recitations of claims 4, 5, 7, 8, and 26 but does not set forth any rationale for modifying Kawai in view of Lia to provide the various recitations of the claims." (Appeal Br. 25.)

The Examiner, however, expressly found that Lia or Kawai discloses each of the elements of the disputed claims (Ans. 8, 10), and concluded that it would have been obvious "to incorporate a second control element for removal of slack as taught by Lia into the manipulatable endoscope taught

by Kawai in order to remove unnecessary slack that slows down responsiveness of the endoscope to bending commands" (*id.* at 6–7). Appellants have not provided any basis for concluding that the Examiner's rationale for combining Kawai and Lia would not have suggested including the additional limitations of claims 4, 5, 7, 8, or 26 in the resulting device. Appellants' argument is therefore unpersuasive.

With regard to claim 24, Appellants argue that the Examiner has not cited a disclosure in the cited references that would suggest determining the shape of a lumen based on the determined shape of the instrument, as recited in that claim. (Appeal Br. 26–27.)

This argument is also unpersuasive. Claim 24 depends from claim 22, which depends from claim 1 and adds the limitation that the bendable instrument is positioned in a lumen before the control elements are moved from their calibration positions. Claim 24 adds the limitation of "determining the shape of the lumen using the determined shape of the instrument."

This limitation, however, adds no active step to those recited in claims 1 and 22. It merely requires interpreting the degree to which the instrument is bent as corresponding to the shape of the lumen in which it has been positioned. *Cf. Genetic Technols. Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1379 (Fed. Cir. 2016) (addition of "[t]he mental process of 'performing a prenatal diagnosis' . . . to the routine and conventional physical activity of amplification and analysis of DNA did not distinguish claims 21 and 25," referring to *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371,1378 (Fed. Cir. 2015)). We therefore conclude that the recited limitation does not

patentably distinguish claim 24 from claim 22, which was not argued separately and therefore falls with claim 1. 37 C.F.R. § 41.37(c)(1)(iv). Claims 2, 6, 9–11, and 23–25 have also not been argued separately and likewise fall with claim 1.

Appellants have waived arguments based on Arai. (Appeal Br. 27.) We therefore affirm the rejection of claims 12–14 under 35 U.S.C. § 103(a) as obvious based on Kawai, Lia, and Arai. 37 C.F.R. § 41.37(c)(1)(iv) (The appeal brief must contain "[t]he arguments of appellant with respect to each ground of rejection. . . . The arguments shall explain why the examiner erred as to each ground of rejection contested by appellant."); *Hyatt v. Dudas,* 551 F.3d 1307, 1314 (Fed. Cir. 2008) ("In the event of such a waiver, the PTO may affirm the rejection of the group of claims that the examiner rejected on that ground without considering the merits of those rejections.").

SUMMARY

We affirm both of the rejections on appeal.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED